

**EXTERIOR
VENEER
STANDARDS**



VERMONT MARBLE COMPANY
Practar, Vermont

EXTERIOR VENEER STANDARD

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VERMONT MARBLE COMPANY
Practar, Vermont

EXTERIOR VENEER STANDARD

1.0 SCOPE

This covers all thin marble and granite veneer installed as exterior building cladding except as part of a precast or preassembled panel.

For listing of materials approved for jointing, anchoring, setting of marble and/or granite and waterproofing, see Appendix - A.

2.0 VENEER

2.1 Varieties

All veneers shall be Marble Institute of America Group A marble or other selected varieties of marble and granite as approved by the Architects and the Vermont Marble Company.

2.2 Thickness

For multistory buildings or where large panels are required, 1 1/4", 1 1/2" or 2" thickness shall be used. Material 7/8" thick is generally suitable for building heights up to 24 feet as per Appendix - D-2.

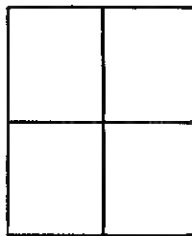
Note: Traffic level course should be of greater thickness to provide resistance to impact.

2.3 Sizes

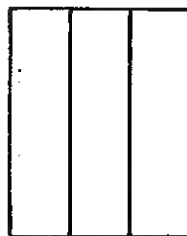
The face dimensions of individual pieces should fit stack with minimum waste. If not, Home Office shall be informed so prices can be figured accordingly. Danbys and Rutlands are quarried to make slab sizes of 6'-0" x 7'-2". Therefore, finished sizes should not exceed:

- (A) 2'-10" x 3'-6"
- (B) 1'-10" x 7'-0"
- (C) 5'-10" x 3'-6"

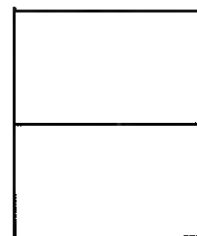
DIMENSION OF 4'-0" EITHER WAY SHOULD BE AVOIDED.



A



B



C

Note: Verde Antique blacks are all quarried to make slabs 4'-0" wide. The length will vary due to quarry conditions.

2.4 Finishes

All exposed surfaces shall be finished as follows:

2.4.1 Fine Sand Finish.

2.4.2 Exterior Hone Finish, a smooth satiny finish.

2.4.3 Polish Finish (for V. A. and Granite only), a very smooth glossy finish which brings out full color and character of the material.

2.5 Waterproofing

2.5.1 Setting by spat method. Veneer is waterproofed on back and the waterproofing shall be removed at point of spot by setters. Any waterproofing used on a back-up wall should be of a type that will not stain or bleed into the marble.

2.5.2 Setting by solid grout. Marble or granite must not be waterproofed on the back nor treated with any material which would tend to impair bonding of grout to the slab. No waterproofing should be applied to back-up wall with solid grout installation.

3.0 JOINTS

3.1 Intermediate Joints

All joints shall be minimum 3/16" wide. Plastic spacers shall be used in joints.

3.2 Expansion Joints

Provision shall be made at floor height intervals for thermal expansion and contraction in a vertical direction by including horizontal joints which are weatherproof and contain no rigid materials. Refer to Appendix - C, Detail Sheets C-5 and C-6.

Provision shall also be made for thermal expansion and contraction in a horizontal direction by including vertical joints which are weatherproof and contain no rigid materials.

These joints in veneer shall be located at the expansion joints in the back-up wall and at other locations as determined by dimension and design.

Width of joints shall be twice the expansion calculated from the known thermal coefficient of the stone, the temperature range expected and the spacing between joints. See Appendix - B for chart.

3.3 Back-up Material

Behind the sealant in all expansion joints shall be resilient materials in the form of foams, fibers, gaskets or structured strips.

3.4 Sealants

The sealing compounds applied to all joints shall be weatherproof, shall not stain the veneer and shall not corrode metal fittings and fixtures.

3.5 Weep Holes

Weep holes shall be provided in the bottom joint on all wall areas. See Appendix C - 7.

3.6 Quirk Miter Joints

All quirk miter joints shall have a minimum 3/8" quirk. See Appendix C - 3.

4.0 ANCHORAGE

4.1 Materials

To prevent electrolytic action no two dissimilar metals shall be in contact in final structure. All materials shall be inherently nonrusting or treated to prevent oxidation. Where dissimilar metals must be used, insulating washers and sleeves or through washers shall be used.

4.2 Supports

Veneer shall be supported at bottom of the wall area, over all openings, and above each expansion joint at floor height intervals. Where such support is not provided by projecting seats integral with the primary structure, metal angles shall be installed to carry the veneer, either directly or by attached liners.

4.3 Anchors

All veneer shall be tied to the building structure by anchors which are embedded in holes or slots. In the edge of the marble these holes or slots shall have a minimum depth of 3/4" and shall be parallel to and equidistant from the front and back faces. Where edge anchors cannot be used, tunnel holes shall be drilled in back surface to receive tie-back shoelace wire or clips. Refer to Appendix - C, Detail Sheet C-2 and C-3.

Straps, cramps, dowels and anchors for intermediate joints shall be mortared into holes and slots which shall be not more than 1/8" larger in the tie-back direction than the strap, cramp, dowel or anchor imbedded. For expansion joints, use resilient material. Refer to Appendix - C, Detail Sheet C-5 and C-6.

Wire side anchors shall be installed at 45° up and in toward support.

Quirk miter joints shall have cramps at top and bottom joints and anchors at intermediate joints as determined by Paragraph No. 4.4, number and distribution.

Anchor slots, boxes and holes shall be cast in concrete walls at time of pouring.

When work is not in progress, the top of all wall areas where veneer is being installed shall be fully protected by a waterproof cover.

During setting, any mortar droppings or setting materials splashed on the face of the veneer shall be removed immediately and the surface cleaned.

Mortar shall be used before initial set has taken place.

No setting shall be performed when the outside temperature is 40°F and falling, unless a satisfactory method has been provided to maintain the veneer, the back-up wall and all setting materials continuously at 40°F or above. This temperature must be maintained for at least 48 hours after setting is finished. No antifreeze compounds shall be used in the mortar.

5.2 Methods

5.2.1 Spot Set on Concrete and Masonry

Set veneer by spotting back of pieces at anchor locations and at 18" centers with setting mortar. To hasten setting operation, spots of plaster may be used in addition to mortar spots for holding veneer in position until mortar sets.

Align and plumb to conform to approved drawings.

At least 1/2" and not more than 1 1/2" clearance shall be allowed between back of veneer and face of back-up from which all protruding mortar has been removed.

Wire anchors shall be attached to back-up wall by inserting looped end into hole shaped to receive and retain same when filled with accelerated cement mortar.

Strap anchors shall be built at least 3" into masonry walls.

Dovetail and T-tail anchors shall be secured in slats or boxes cast into concrete walls.

All joints, except expansion joints and quirk miter joints, shall be fully buttered with setting mortar as each slab is set on plastic spacers recessed 1/2" from front face and these joints shall be raked for sealing before mortar sets.

5.2.2 Solid Grout Set on Concrete and Masonry

Veneer shall not be waterproofed on the back nor treated with any material which would impair bonding of grout to slab.

At expansion joints in veneer, corresponding expansion joints shall be provided in the grout.

Align and plumb to conform to approved drawings.

At least 1" and not more than 1 1/2" clearance shall be allowed between back of veneer and face of back-up from which all protruding mortar has been removed.

Wire anchors shall be looped or bent and secured at least 2" into wall.

Strap anchors shall be built at least 2" into wall.

Dovetail or T-tail anchors shall be secured in slots or boxes cast into concrete wall.

All joints, except expansion joints and quirk miter joints, shall be fully buttered with setting mortar as each slab is set on plastic spacers recessed 1/2" from front face and these joints shall be raked for sealing before mortar sets. All voids between back-up and veneer shall be filled with grout which shall be poured after each course of veneer is set. Depth of pour shall not exceed 6". Grout shall be rodded and puddled as required to fill all voids and allowed to set sufficiently to carry the weight of the next pour.

5.3 Caulking and Sealing

5.3.1 Intermediate joints and joints between veneer and other materials shall be pointed with a nonstaining sealant in accordance with the recommendation of the manufacturer.

5.3.2 Expansion joints shall have spacers removed and be pointed with a nonstaining elastic sealant in accordance with the recommendations of the manufacturer.

5.3.3 Quirk miter joints shall have nonstaining sealant applied to both faces of miter at time of setting. Excess shall be removed from quirks.

5.4 Cleaning and Protection

After all veneer work is completed, phase by phase, the work shall be thoroughly cleaned using nonmetallic fiber brushes and clean water.

No acids or acidic preparations shall be used in areas where marble veneer is installed. Protection shall be provided by contractor to all veneer work prior to final acceptance.

APPENDIX - A

MATERIAL SELECTION, GENERAL

The selection of materials to be used in setting marble and granite veneer shall take into account the individual properties of each material and its behavior alone, and in combination with each and every other material employed.

Every material in contact with the stone as veneer or cubic shall produce no evidence of staining or alteration in appearance of the stone either by itself or in combination with another material as a consequence of aging, chemical reaction or environmental attack.

No dissimilar metals shall be used in direct contact in order to minimize corrosion by galvanic action. Insulating washers, sleeves or through washers shall be used where necessary to prevent contact between metallic components from dissimilar groups of metallic alloys.

Recommended materials are listed for guidance in selection of components and are not intended to exclude materials which are known to be capable of equivalent performance in accordance with requirements.

MATERIALS RECOMMENDED

1. Joint Spacers - Nylon, vinyl chloride, polyester.
2. Joint Backup - Vinyl chloride, polyethylene, polyurethane and polystyrene as extruded tubes, foams or flexible shapes and mortar.
3. Joint Sealants - For expansion joints: neoprene; butyl; polysulfide; silicone.

For intermediate joints in spot setting method: any of the above elastomers plus nonstaining mastics.

For intermediate joints in solid grout setting: any of the above elastomers plus nonstaining mastics and waterproof mortar.
4. Hardware - Metal-to-metal contacts shall be limited to pairs as indicated by the affirmative at the intersection of the vertical and horizontal lines of the two respective metals in the following table.

APPENDIX - A

	S. S.	Copper	Bronze	Bross	Aluminum	Iron *
S. S.	Yes	Yes	Yes	Yes	Yes	No
Copper	Yes	Yes	Yes	Yes	No	No
Bronze	Yes	Yes	Yes	Yes	No	No
Bross	Yes	Yes	Yes	Yes	No	No
Aluminum	Yes	No	No	No	Yes	No
Iron *	No	No	No	No	No	No

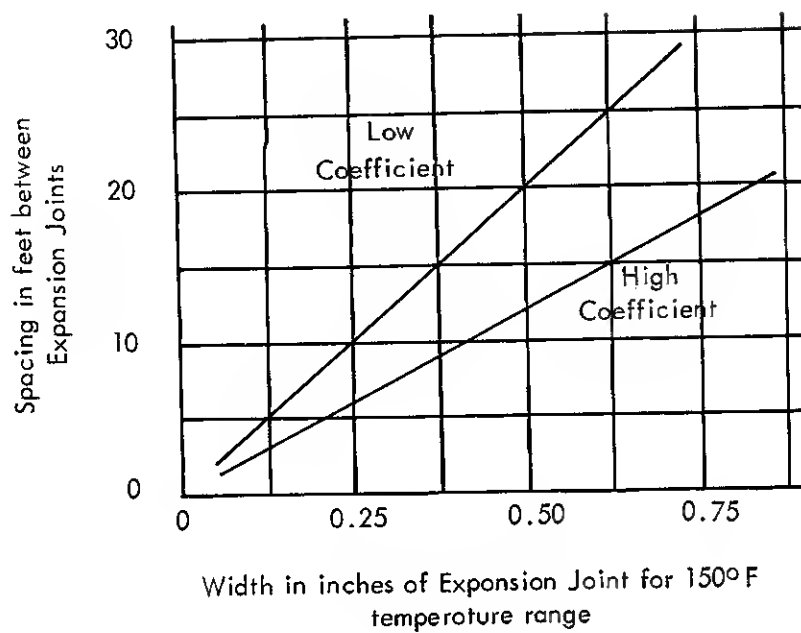
* Iron hardware is not recommended, even though coated or treated.

5. Mortar Components and Compositions

- a. Cement - Portland White and/or Gray which conforms to ASTM: C 150-63.
- b. Sand - Clean, washed, sharp aggregate which conforms to ASTM: C 33-64.
- c. Water - Potable and free of materials detrimental to mix.
- d. Additives - Lime and accelerators.
- e. Mix for hardware installation, spots and joints -
 - 1 part nonstaining Portland cement
 - 3 parts sand
 - 1/5 part hydrated lime
 - 6 gallons water per sack of cement
- f. Mix for Solid Grouting -
 - 1 part nonstaining Portland cement
 - 3 parts sand
 - 6 1/2 gallons water per sack of cement

APPENDIX - B

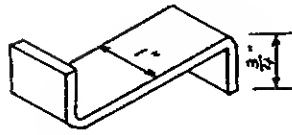
Expansion Joint Width and Spacing



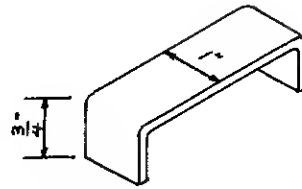
Dimensions outside range of this chart require special consideration.

Horizontal Expansion Joints recommended at floor height intervals.

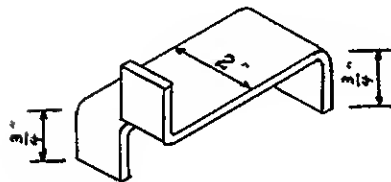
APPENDIX C



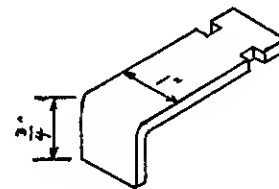
STRAP ANCHOR



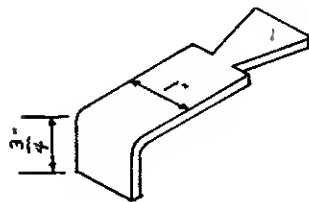
STRAP CRAMP



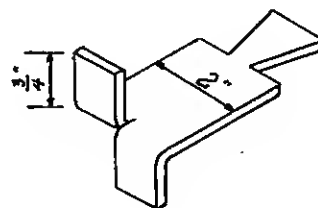
2-WAY STRAP



T-TAIL STRAP



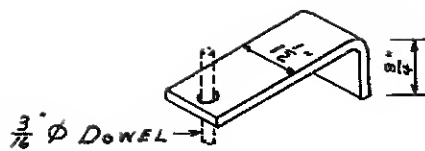
DOVE-TAIL STRAP



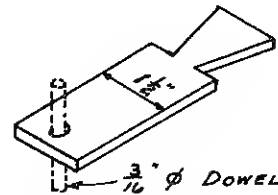
2-WAY DOVE-TAIL

TYPES OF ANCHORS

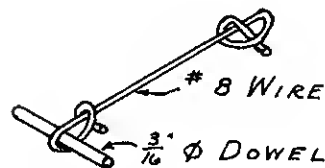
($\frac{1}{16}$ " TH. S.S. STRAPS - OTHER MATERIALS $\frac{1}{8}$ " THICK)
LENGTH TO BE GOVERNED BY JOB CONDITIONS.



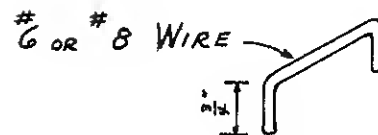
L-STRAP
WITH DOWEL



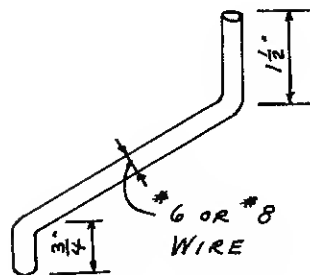
DOVE-TAIL STRAP
WITH DOWEL



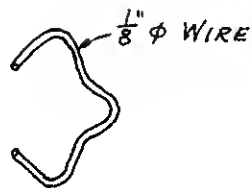
WIRE TIE-BACK
WITH DOWEL



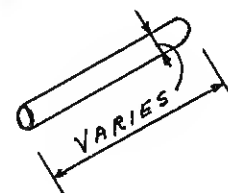
WIRE CRAMP



WIRE ANCHOR



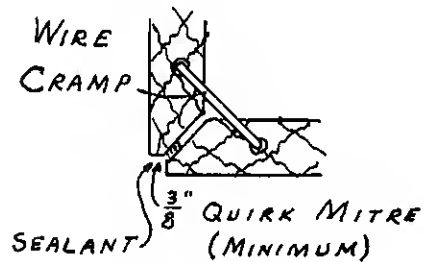
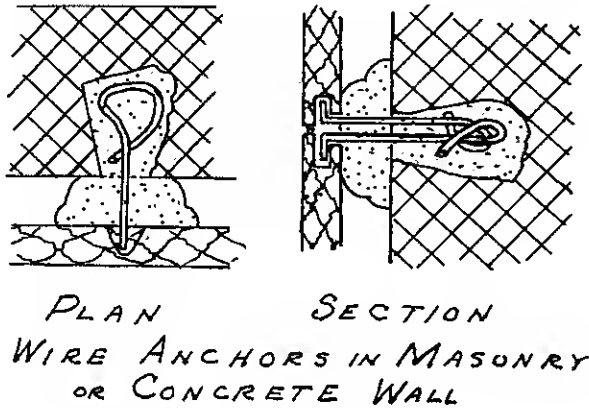
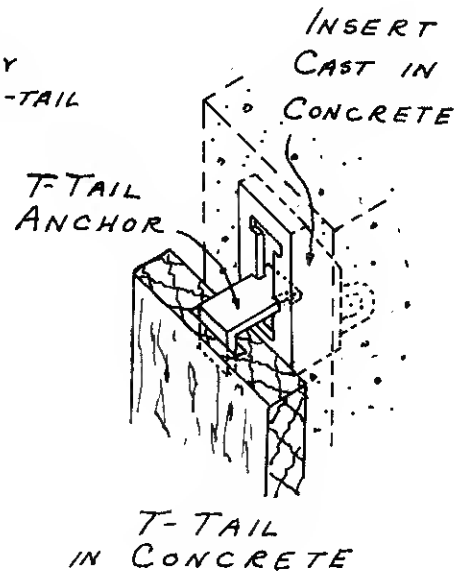
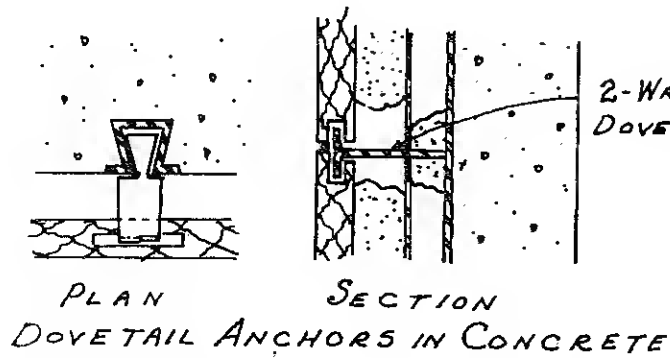
CLIP
ANCHOR



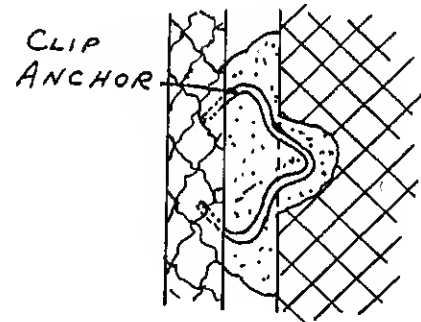
DOWELS

TYPES OF ANCHORS

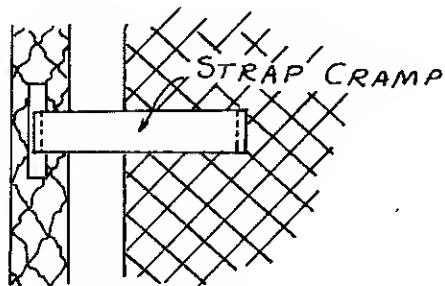
($\frac{1}{16}$ " TH. S.S. STRAPS - OTHER MATERIALS $\frac{1}{8}$ " THICK)
LENGTH TO BE GOVERNED BY JOB CONDITIONS.



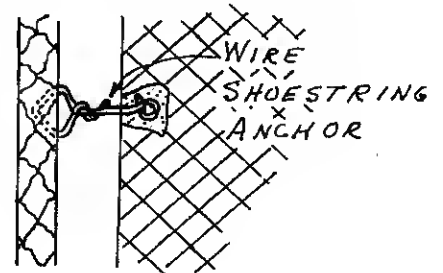
WIRE CRAMP AT CORNER



CLIP ANCHOR IN MASONRY

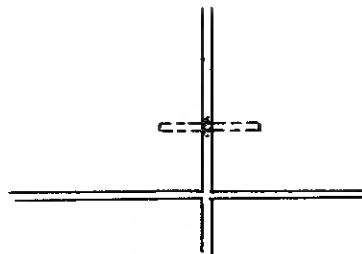


STRAP CRAMP IN MASONRY

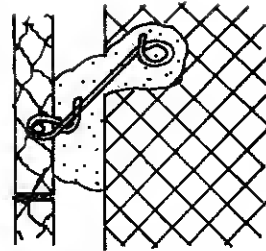


SHOESTRING IN MASONRY

METHODS OF ANCHORING

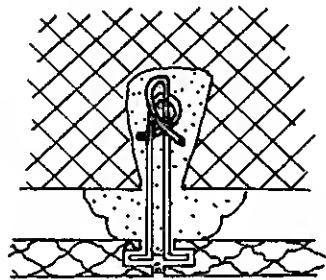


ELEVATION

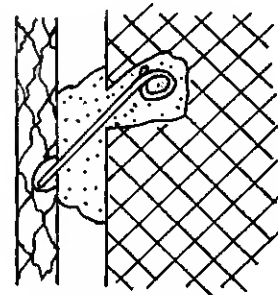


SECTION

WIRE TIE-BACK AROUND DOWEL
IN EDGE OF PANEL



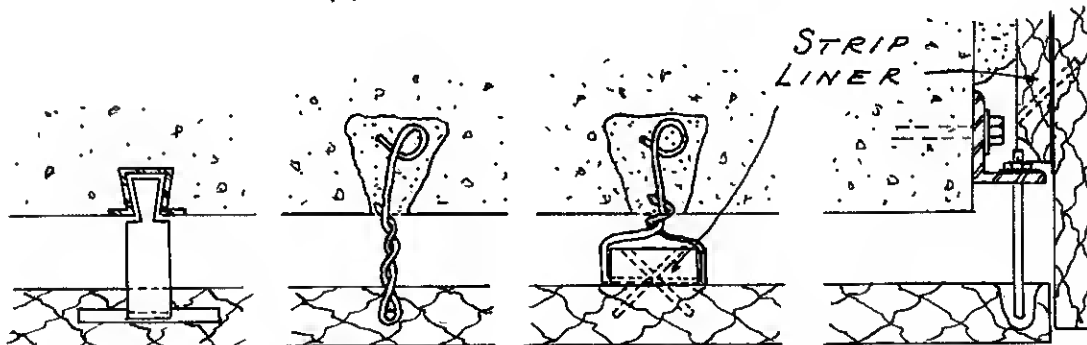
PLAN



SECTION

WIRE ANCHORS IN MASONRY
OR CONCRETE WALL

VERTICAL JOINTS



DOVE-TAIL
ANCHOR
IN JOINT

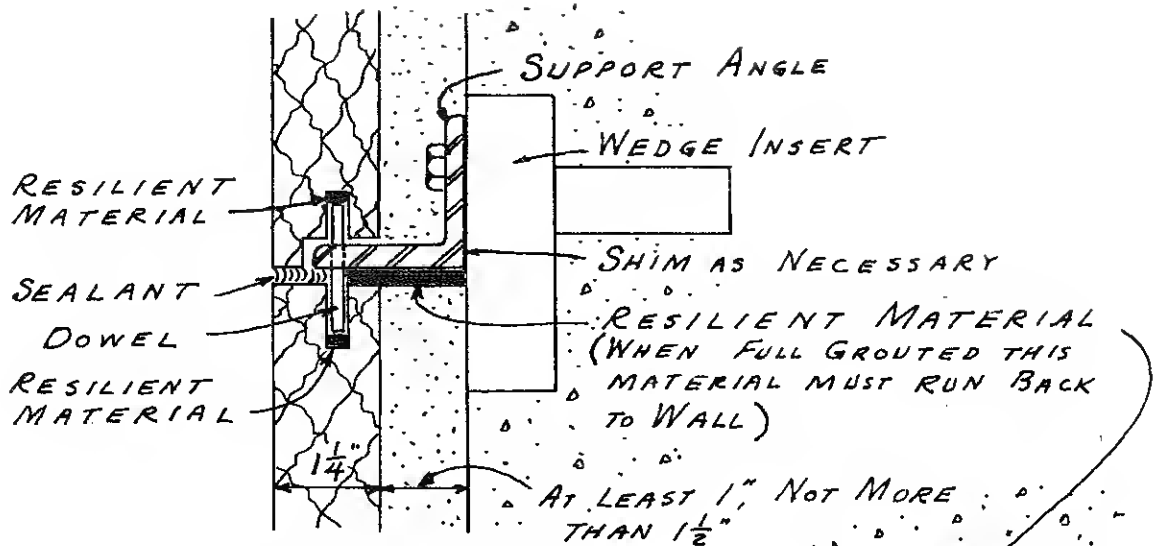
TIE BACK
AND DOWEL
IN JOINT

LINER
WITH WIRE
HANGER

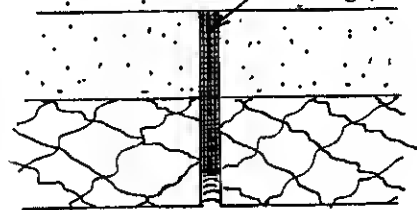
ROD HANGER
THRU ANGLE

SUPPORTS FOR SOFFITS

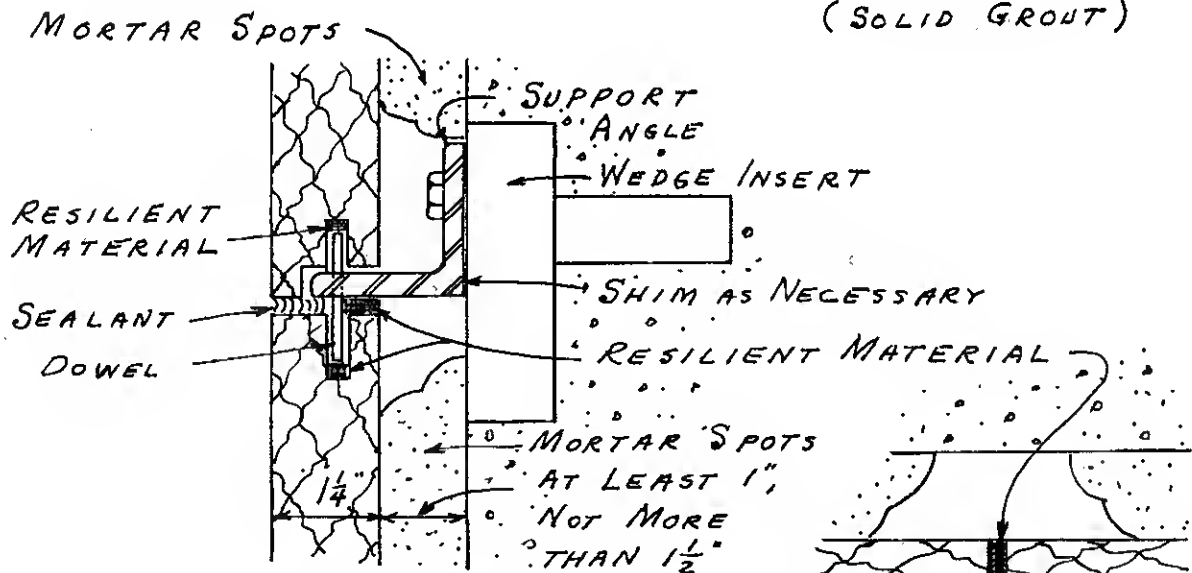
METHODS OF ANCHORING



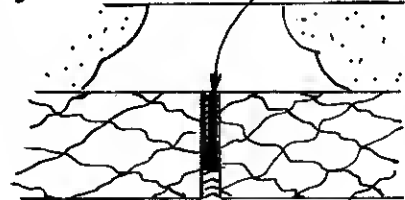
**ANGLE SUPPORT
(SOLID GROUT)**



**VERTICAL JOINT
(SOLID GROUT)**

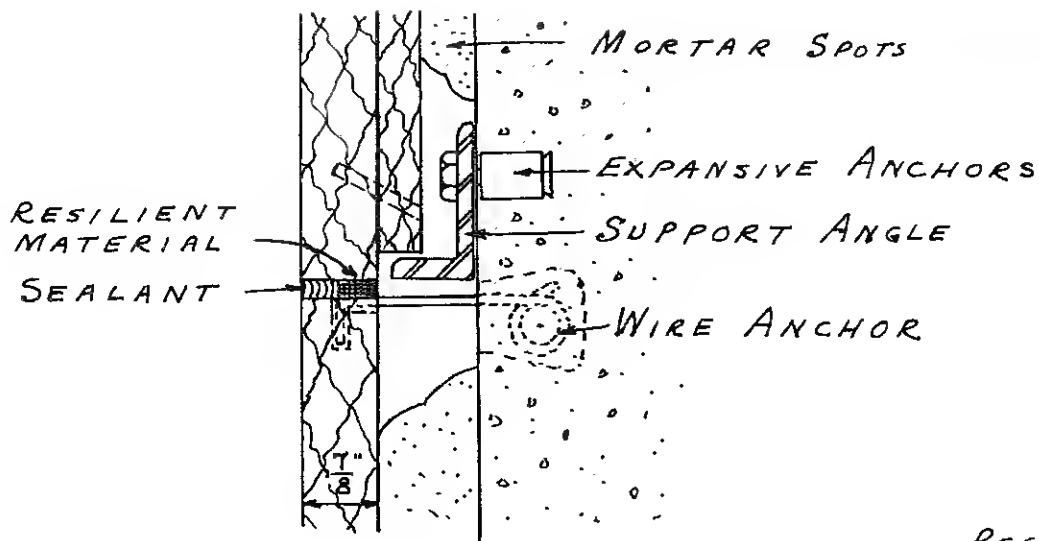


**ANGLE SUPPORT
(SPOT SET)**

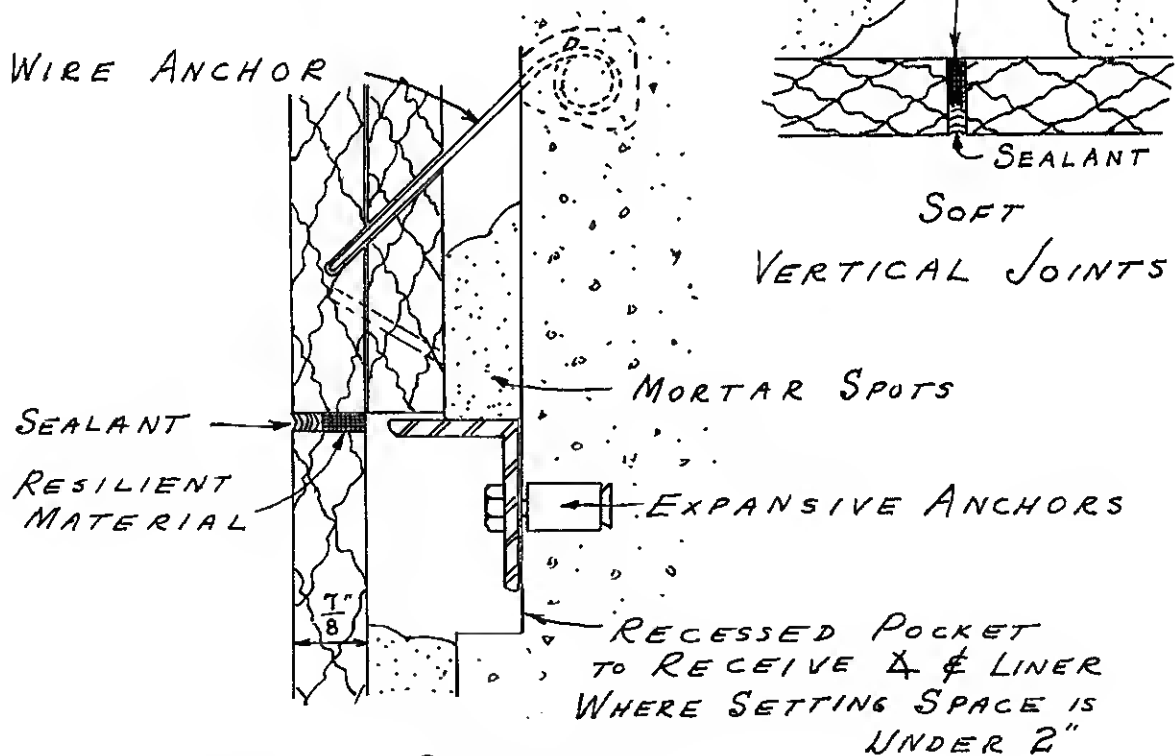


**VERTICAL JOINT
(SPOT SET)**

EXPANSION JOINTS

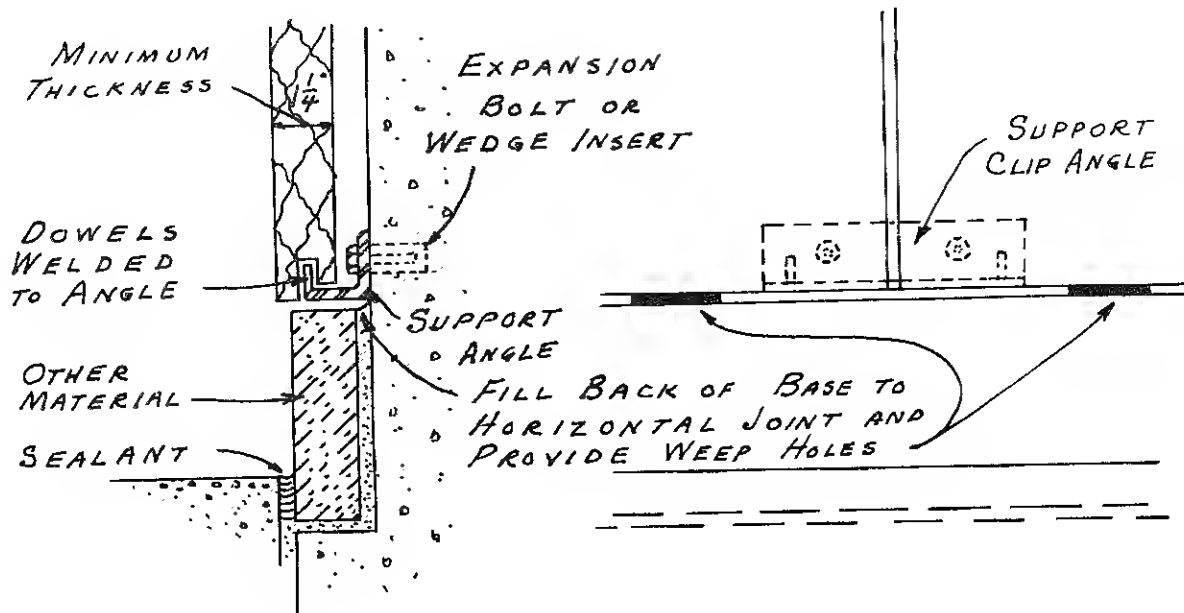


ANGLE SUPPORT
(SETTING SPACE MORE THAN 2")

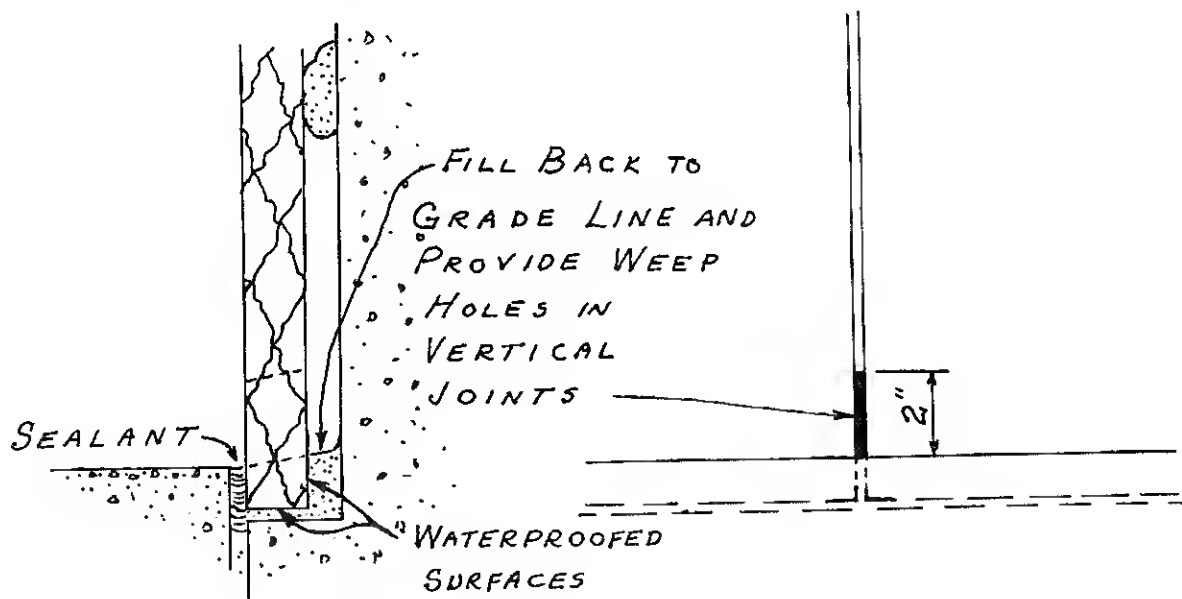


ANGLE SUPPORT
(SETTING SPACE LESS THAN 2")

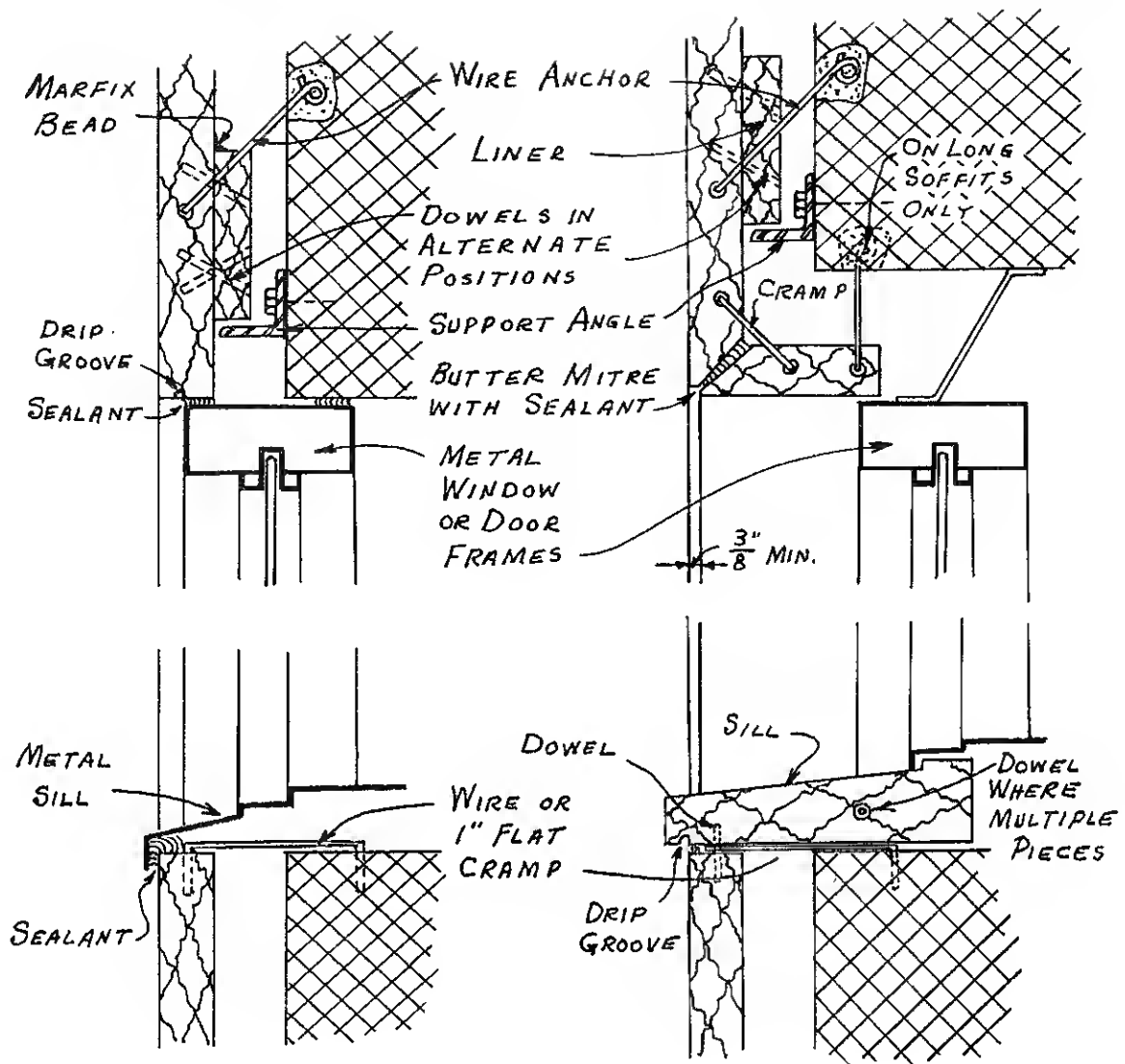
EXPANSION JOINTS



SECTION ELEVATION
VENEER ON OTHER MATERIALS WITH WEEP HOLES AT ANGLES



SECTION ELEVATION
VENEER AT GRADE WITH WEEP HOLES IN VERTICAL JOINTS



VERTICAL SECTION
THRU WINDOW WITH METAL
FRAME AND SILL

VERTICAL SECTION
THRU WINDOW WITH VENEER
RETURN AND SOFFIT AND SILL

SUPPORT AND ANCHORAGE
(AT WINDOWS)

APPENDIX - D

Edge Anchors required for veneer 1 1/4 and thicker,
based on 24" maximum spacing along any edge.

Piece Heights, Vertical	7-0	8	10	10	10																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																</
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Piece sizes outside the range
of this table require special
additional anchoring.

Distribution:

In top and bottom:

Under 0-8 width	1
0-8 thru 3-6 width	2
3-7 thru 5-6 width	3
5-7 thru 7-0 width	4

In each vertical edge:

Under 2-1 height	0
2-1 thru 4-0 height	1
4-1 thru 6-0 height	2
6-1 thru 7-0 height	3

APPENDIX - D

Edge Anchors required for 7/8 veneer,
based on 18" maximum spacing along any edge.

	0-6	1-0	1-6	2-0	2-6	3-0	3-6	4-0	4-6	5-0	5-6	6-0	6-6	7-0	
1-0	2	4	4	4	4	4	4	6	6	6	8	8	8	10	10
1-6	2	4	4	4	4	4	4	6	6	6	8	8	8	10	10
2-0	4	6	6	6	6	6	6	8	8	8	10				
2-6	4	6	6	6	6	6	6								
3-0	4	6	6	6	6	6	6								
3-6	6	8	8	8	8	8	8								
4-0	6	8	8	8	8	8	8								
4-6	6	8	8	8	8	8	8								
5-0	8	10	10	10	10	10									
5-6	8	10	10												
6-0	8	10	10												
6-6	10	12	12												
7-0	10	12	12												

Piece sizes outside the range of this table require increased thickness.

Distribution:

In top and bottom:

Under 0-8 width	1
0-8 thru 3-0 width	2
3-1 thru 4-6 width	3
4-7 thru 6-0 width	4
6-1 thru 7-0 width	5

In each vertical edge:

Under 1-7 height	0
1-7 thru 3-0 height	1
3-1 thru 4-6 height	2
4-7 thru 6-0 height	3
6-1 thru 7-0 height	4